
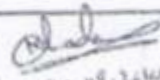


Lampiran 1. Sertifikat salbutamol sulfat

CERTIFICATE OF ANALYSIS

Cipla

BATCH NO. : 25/11710-11 ✓ A. & S. NO. : PK1509598 Qty. : 1 x 25 kg	<b>SALBUTAMOL SULPHATE</b>	MPC. DT. : 24/08/2018 ✓ ESP. DT. : 23/01/2015 ✓
<b>TEST</b>	<b>STANDARD</b>	<b>RESULT</b>
<b>DESCRIPTION</b>	White or almost white, crystalline powder.	Meets the requirement
<b>SOLUBILITY</b>	Freely soluble in water, practically insoluble or very slightly soluble in ethanol (96 %) and in methylene chloride.	Meets the requirement
<b>IDENTIFICATION</b>	<b>B)</b> The infrared spectrum of the sample is concordant with the spectrum obtained with salbutamol sulphate CRS. <b>E)</b> It gives reaction (a) of sulphates.	Meets the requirement Meets the requirement
<b>APPEARANCE OF SOLUTION</b>	Solution S is clear and not more intensely coloured than reference solution 9V <sub>4</sub> .	Meets the requirement
<b>OPTICAL ROTATION (°)</b>	-0.100 to +0.100.	Nil
<b>ACIDITY OR ALKALINITY</b>	Not more than 0.4 ml of 0.01 N hydrochloric acid is required to change the colour of the indicator to red.	Meets the requirement
<b>IMPURITY J (%)</b>	NMT 0.20	0.01
<b>RELATED SUBSTANCES (%)</b>		Meets the requirement
Impurity A	NMT 0.30	Not detected
Impurity B	NMT 0.30	0.18
Impurity C	NMT 0.30	0.22
Impurity D	NMT 0.30	0.09
Impurity E	NMT 0.30	Not detected
Impurity F	NMT 0.30	0.05
Impurity G	NMT 0.30	Not detected
Impurity H	NMT 0.30	Not detected
Impurity I	NMT 0.30	Not detected
Total Impurities	NMT 1.00	0.54
<b>BORON (ppm)</b>	NMT 50	Meets the requirement
<b>LOSS ON DRYING (%)</b>	NMT 0.50	0.06
<b>SULPHATED ASH (%)</b>	NMT 0.10	0.02
<b>ASSAY (%)</b> C <sub>13</sub> H <sub>17</sub> N <sub>2</sub> O <sub>6</sub> S (dried substance)	NLT 98.0      NMT 101.0	Meets the requirement 100.8
DATE OF ANALYSIS : 15-09-2010		
REMARK : <b>COMPLIES WITH BP 2010 STANDARD</b>		
QUALITY CONTROL : 	QUALITY ASSURANCE : 	
DATE : 20-09-2010	DATE : 20-09-2010	

Cipla Ltd., Mumbai Central, Mumbai 400 008, India  
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QC/F/11

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## Lampiran 2. Menghitung jumlah pengikat yang dibutuhkan tiap tablet

Cara perhitungan jumlah bahan pengikat yang dibutuhkan tiap formula

Contoh perhitungan tablet pada formula II

Bahan	Bobot (mg)
Salbutamol sulfat	12
HPMC	60
Na-CMC	60
Laktosa	57,5
Mg-stearat	0,4
Talk	3,6
PVP-K30 5%	6,5

Bobot granul = 100 gram

Jumlah tablet yang dihasilkan = 500 tablet

Jumlah PVP = 5 gram

Volume awal PVP 5% = 100 ml

volume akhir PVP 5% = 35 ml –

65 ml

jumlah PVP 5% yang digunakan adalah 65 ml

jadi :  $\frac{65 \text{ ml}}{100 \text{ ml}} \times 5 \text{ gram} = 3.25 \text{ gram}$  (berat kering)

Untuk tiap tablet =  $\frac{1}{500} \times 3.25 \times 1 \text{ tablet} = 0.0065 \text{ gram}/\text{tablet} = 6.5 \text{ mg}/\text{tablet}$

## Lampiran 3. Kecepatan alir

Rumus kecepatan alir =  $\frac{\text{berat granul (gram)}}{\text{waktu (detik)}}$

Formula I

Bobot (g)	Waktu (detik)	Kecepatan alir (gram/detik)
	9.4	10.52291
98.91536	9.6	10.30368
	9.7	10.19746
Rata-rata		10.34135
Sd		0.1659

Formula II

Bobot (g)	Waktu (detik)	Kecepatan alir (gram/detik)
	8.5	11.28229
95.8995	8.5	11.28229
	8.7	11.02293
Rata-rata		11.19584
Sd		0.1498

Formula III

Bobot (g)	Waktu (detik)	Kecepatan alir (gram/detik)
	7.5	12.65952
94.9464	7.5	12.65952
	7.4	12.83059
Rata-rata		12.71654
Sd		0.099

Kontrol

Bobot (g)	Waktu (detik)	Kecepatan alir (gram/detik)
	9.6	10.24239
98.3269	9.8	10.03336
	9.9	9.93201
Rata-rata		10.069
Sd		0.1583

**Lampiran 4. Sudut diam**

$$\text{Rumus sudut diam} = \text{archtan} \frac{\text{jari-jari}}{\text{tinggi}}$$

Formula I

Tinggi (cm)	Jari-jari (cm)	Sudut diam
3.925	6.35	31.721
3.925	6.5	31.125
4	6.46	31.766
Rata-rata		31.53733
Sd		0.3578

Formula II

Tinggi (cm)	Jari-jari (cm)	Sudut diam
3.885	6.2325	31.93
3.835	6.1575	31.915
3.835	6.205	31.718
Rata-rata		31.8543
Sd		0.1183

Formula III

Tinggi (cm)	Jari-jari (cm)	Sudut diam
3.615	5.7125	32.32
3.585	5.7	32.167
3.425	5.7425	30.81
Rata-rata		31.766
Sd		0.8312

Kontrol

Tinggi (cm)	Jari-jari (cm)	Sudut diam
2.72	4.8175	29.44
2.73	4.64	30.47
2.73	4.75	29.8875
2.765	4.765	30.125
Rata-rata		29.981
Sd		0.4325

**Lampiran 5. Daya serap air**

Formula I

Berat granul + botol timbang	5 menit	10 menit	15 menit	Daya serap air
22.5476	22.5611	22.5728	22.5730	0.0254
22.5507	22.5697	22.5804	22.5804	0.0297
22.5520	22.5670	22.5785	22.5788	0.0268
Rata-rata				0.0273
SD				0.0022

Formula II

Berat granul + botol timbang	5 menit	10 menit	15 menit	Daya serap air
22.9368	22.9585	22.9915	22.9917	0.0549
22.9417	22.9611	22.9913	22.9916	0.0499
22.9629	22.9867	23.0090	23.0093	0.0464
Rata-rata				0.0504
SD				0.0043

Formula III

Berat granul + botol timbang	5 menit	10 menit	15 menit	Daya serap air
22.5690	22.5811	22.6600	22.6603	0.0913
22.5486	22.5891	22.6379	22.6382	0.0896
22.5619	22.6120	22.6541	22.6543	0.0924
Rata-rata				0.0911
SD				0.0014

Kontrol

Berat granul + botol timbang	5 menit	10 menit	15 menit	Daya serap air
15.4154	15.7417	15.8836	15.8840	0.4686
15.4301	15.6891	15.8275	15.8284	0.3983
15.4333	15.6799	15.8519	15.8524	0.4191
Rata-rata				0.4287
SD				0.036

**Lampiran 6. pengetapan**

$$\text{Rumus Pengetapan} = \frac{\text{volume awal} - \text{volume akhir}}{\text{volume akhir}} \times 100 \%$$

Formula I

Volume awal (ml)	Volume akhir (ml)	% pengetapan
100	96	4
100	94	6
100	94	6
Rata-rata		5.333333
Sd		1.155

Formula II

Volume awal (ml)	Volume akhir (ml)	% pengetapan
100	93	7
100	91	9
100	90	10
Rata-rata		8.666667
Sd		1.527

Formula III

Volume awal (ml)	Volume akhir (ml)	% pengetapan
100	95	5
100	94	6
100	94	6
Rata-rata		5.666667
Sd		0.577

Kontrol

Volume awal (ml)	Volume akhir (ml)	% pengetapan
100	93	7
100	93	7
100	91	9
Rata-rata		7.666667
Sd		1.155

**Lampiran 7. Keseragaman bobot**

Tablet	Formula I	Formula II	Formula III	Kontrol
	Bobot (mg)	Bobot (mg)	Bobot (mg)	Bobot (mg)
1	199	203	203	196
2	201	202	201	195
3	196	209	205	197
4	203	204	200	212
5	198	200	202	191
6	204	207	205	197
7	193	206	203	197
8	203	201	199	197
9	204	200	209	198
10	204	200	198	203
11	205	208	199	202
12	200	201	201	197
13	200	203	202	198
14	203	206	209	195
15	206	205	200	199
16	201	200	200	198
17	202	206	201	197
18	206	199	203	200
19	198	201	205	198
20	202	206	209	199
Rata-rata	201.4	203.35	202.7	198.3
SD	3.377	3.826	3.373	4.092
CV	1.677	1.881	1.664	2.064

### Lampiran 8. Kerapuhan

$$\% \text{ Kerapuhan} = \frac{\text{bobot awal} - \text{bobot akhir}}{\text{bobot awal}} \times 100\%$$

Penimbangan	Formula I	Formula II	Formula III	Kontrol
Bobot awal (gram)	4,132	4,098	4,156	4,054
Bobot akhir (gram)	4,120	4,083	4,133	4,041
Kerapuhan (%)	0,29	0,37	0,55	0,32

### Lampiran 9. Kompaktibilitas

Replikasi	Formula I	Formula II	Formula III	Kontrol
1	14	13.8	13.6	7.7
2	13.4	14.2	14	7.8
3	14	14	14.4	7.5
Rata-rata	13.8	14	14	7.667
Sd	0.346	0.2	0.4	0.153

### Lampiran 10. Pembuatan kurva baku salbutamol sulfat

Penimbangan bahan

Ketas timbang + zat = 0,3979 g

Kertas timbang + sisa = 0,2979 g \_

Bobot zat = 0,100 g

Kadar salbutamol sulfat = 0,100 g / 100 ml = 100 mg/100ml = 1 mg/ml

❖ Konsentrasi 25 ppm

$$V1 \times N1 = V2 \times N2$$

$$100 \text{ ml} \times 25 \text{ ppm} = V2 \times 1000 \text{ ppm}$$

$$V2 = \frac{2500 \text{ ppm}}{1000 \text{ ppm}}$$

$$V2 = 2,5 \text{ ml}$$

❖ Konsentrasi 100 ppm

$$V1 \times N1 = V2 \times N2$$

$$100 \text{ ml} \times 100 \text{ ppm} = V2 \times 1000 \text{ ppm}$$

$$V2 = \frac{10000 \text{ ppm}}{1000 \text{ ppm}}$$

$$V2 = 10 \text{ ml}$$

❖ Konsentrasi 50 ppm

$$V1 \times N1 = V2 \times N2$$

$$100 \text{ ml} \times 50 \text{ ppm} = V2 \times 1000 \text{ ppm}$$

$$V2 = \frac{5000 \text{ ppm}}{1000 \text{ ppm}}$$

$$V2 = 5 \text{ ml}$$

❖ Konsentrasi 125 ppm

$$V1 \times N1 = V2 \times N2$$

$$100 \text{ ml} \times 125 \text{ ppm} = V2 \times 1000 \text{ ppm}$$

$$V2 = \frac{12500 \text{ ppm}}{1000 \text{ ppm}}$$

$$V2 = 12,5 \text{ ml}$$

❖ Konsentrasi 75 ppm

$$V1 \times N1 = V2 \times N2$$

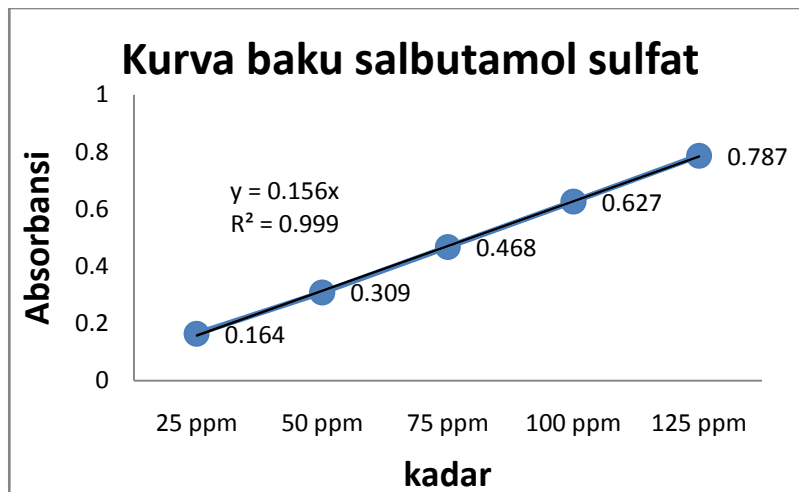
$$100 \text{ ml} \times 75 \text{ ppm} = V2 \times 1000 \text{ ppm}$$

$$V2 = \frac{7500 \text{ ppm}}{1000 \text{ ppm}}$$

$$V2 = 7,5 \text{ ml}$$

### Hasil absorbansi pembuatan kurva baku salbutamol sulfat

Konsentrasi	Absorbansi
25 ppm	0.164
50 ppm	0.309
75 ppm	0.468
100 ppm	0.627
125 ppm	0.787





### Lampiran 11. Perhitungan kadar salbutamol sulfat

Rumus perhitungan kadar :  $\frac{\text{kadar (mg/ml)} \times \text{volum media disolusi} \times \text{fx}}{\text{dosis salb.sulfat dalam 1 tablet}} \times 100\%$

Volum media disolusi : 900 ml  
 Dosis salb.sulfat 1 tablet : 12 mg  
 Fx : faktor pengenceran

#### Formula I Replikasi 1

Waktu (menit)	Absorbansi	Kadar (ppm)	Kadar (mg/ml)	Kadar 900ml	Faktor pengenceran	Kadar %
30	0.007	0.83114	0.00083	0.74802	1	6.23
60	0.011	1.47047	0.00147	1.32342	1	11.03
90	0.013	1.79014	0.00179	1.61112	1	13.43
120	0.016	2.26964	0.00227	2.04268	1	17.02
150	0.02	2.90897	0.00291	2.61808	1	21.82
180	0.024	3.54831	0.00355	3.19348	1	26.61
210	0.027	4.02781	0.00403	3.62503	1	30.21
240	0.029	4.34748	0.00435	3.91273	1	32.61
270	0.032	4.82698	0.00483	4.34428	1	36.20
300	0.032	4.82698	0.00483	4.34428	1	36.20
330	0.036	5.46632	0.00547	4.91968	1	41.00
360	0.04	6.10565	0.00611	5.49509	1	45.79

#### Formula I Replikasi 2

Waktu (menit)	Absorbansi	Kadar (ppm)	Kadar (mg/ml)	Kadar 900ml	Faktor pengenceran	Kadar %
30	0.005	0.51147	0.00051	0.46032	1	3.84
60	0.008	0.99097	0.00099	0.89187	1	7.43
90	0.01	1.31064	0.00131	1.17957	1	9.83
120	0.014	1.94997	0.00195	1.75497	1	14.62
150	0.016	2.26964	0.00227	2.04268	1	17.02
180	0.019	2.74914	0.00275	2.47423	1	20.62
210	0.023	3.38848	0.00339	3.04963	1	25.41
240	0.025	3.70814	0.00371	3.33733	1	27.81
270	0.028	4.18764	0.00419	3.76888	1	31.41
300	0.031	4.66715	0.00467	4.20043	1	35.00
330	0.033	4.98681	0.00499	4.48813	1	37.40
360	0.037	5.62615	0.00563	5.06353	1	42.20

Formula I Replikasi 3

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.006	0.67130	0.00067	0.60417	1	5.03
<b>60</b>	0.008	0.99097	0.00099	0.89187	1	7.43
<b>90</b>	0.01	1.31064	0.00131	1.17957	1	9.83
<b>120</b>	0.015	2.10981	0.00211	1.89883	1	15.82
<b>150</b>	0.018	2.58931	0.00259	2.33038	1	19.42
<b>180</b>	0.02	2.90897	0.00291	2.61808	1	21.82
<b>210</b>	0.025	3.70814	0.00371	3.33733	1	27.81
<b>240</b>	0.027	4.02781	0.00403	3.62503	1	30.21
<b>270</b>	0.027	4.02781	0.00403	3.62503	1	30.21
<b>300</b>	0.03	4.50731	0.00451	4.05658	1	33.80
<b>330</b>	0.033	4.98681	0.00499	4.48813	1	37.40
<b>360</b>	0.037	5.62615	0.00563	5.06353	1	42.20

Rata-rata kadar salbutamol sulfat formula I

<b>Waktu (menit)</b>	<b>Replikasi 1</b>	<b>Replikasi 2</b>	<b>Replikasi 3</b>	<b>Rata-rata kadar %</b>
<b>30</b>	6.23	3.84	5.03	5.03
<b>60</b>	11.03	7.43	7.43	8.63
<b>90</b>	13.43	9.83	9.83	11.03
<b>120</b>	17.02	14.62	15.82	15.82
<b>150</b>	21.82	17.02	19.42	19.42
<b>180</b>	26.61	20.62	21.82	23.02
<b>210</b>	30.21	25.41	27.81	27.81
<b>240</b>	32.61	27.81	30.21	30.21
<b>270</b>	36.20	31.41	30.21	32.61
<b>300</b>	36.20	35.00	33.80	35.00
<b>330</b>	41.00	37.40	37.40	38.60
<b>360</b>	45.79	42.20	42.20	43.39

Formula II Replikasi 1

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.004	0.35163	0.00035	0.31647	1	2.64
<b>60</b>	0.013	1.79014	0.00179	1.61112	1	13.43
<b>90</b>	0.018	2.58931	0.00259	2.33038	1	19.42
<b>120</b>	0.022	3.22864	0.00323	2.90578	1	24.21
<b>150</b>	0.026	3.86798	0.00387	3.48118	1	29.01
<b>180</b>	0.03	4.50731	0.00451	4.05658	1	33.80
<b>210</b>	0.033	4.98681	0.00499	4.48813	1	37.40
<b>240</b>	0.037	5.62615	0.00563	5.06353	1	42.20
<b>270</b>	0.039	5.94582	0.00595	5.35123	1	44.59
<b>300</b>	0.038	5.78598	0.00579	5.20738	1	43.39
<b>330</b>	0.041	6.26548	0.00627	5.63894	1	46.99
<b>360</b>	0.045	6.90482	0.00690	6.21434	1	51.79

Formula II Replikasi 2

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.003	0.19180	0.00019	0.17262	1	1.44
<b>60</b>	0.011	1.47047	0.00147	1.32342	1	11.03
<b>90</b>	0.015	2.10981	0.00211	1.89883	1	15.82
<b>120</b>	0.021	3.06881	0.00307	2.76193	1	23.02
<b>150</b>	0.023	3.38848	0.00339	3.04963	1	25.41
<b>180</b>	0.028	4.18764	0.00419	3.76888	1	31.41
<b>210</b>	0.031	4.66715	0.00467	4.20043	1	35.00
<b>240</b>	0.034	5.14665	0.00515	4.63198	1	38.60
<b>270</b>	0.036	5.46632	0.00547	4.91968	1	41.00
<b>300</b>	0.038	5.78598	0.00579	5.20738	1	43.39
<b>330</b>	0.039	5.94582	0.00595	5.35123	1	44.59
<b>360</b>	0.041	6.26548	0.00627	5.63894	1	46.99

Formula II Replikasi 3

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.005	0.51147	0.00051	0.46032	1	3.84
<b>60</b>	0.012	1.63030	0.00163	1.46727	1	12.23
<b>90</b>	0.018	2.58931	0.00259	2.33038	1	19.42
<b>120</b>	0.023	3.38848	0.00339	3.04963	1	25.41
<b>150</b>	0.023	3.38848	0.00339	3.04963	1	25.41
<b>180</b>	0.029	4.34748	0.00435	3.91273	1	32.61
<b>210</b>	0.032	4.82698	0.00483	4.34428	1	36.20
<b>240</b>	0.034	5.14665	0.00515	4.63198	1	38.60
<b>270</b>	0.036	5.46632	0.00547	4.91968	1	41.00
<b>300</b>	0.035	5.30648	0.00531	4.77583	1	39.80
<b>330</b>	0.037	5.62615	0.00563	5.06353	1	42.20
<b>360</b>	0.04	6.10565	0.00611	5.49509	1	45.79

Rata-rata kadar salbutamol sulfat formula II

<b>Waktu (menit)</b>	<b>Replikasi 1</b>	<b>Replikasi 2</b>	<b>Replikasi 3</b>	<b>Rata-rata kadar %</b>
<b>30</b>	2.64	1.44	3.84	2.64
<b>60</b>	13.43	11.03	12.23	12.23
<b>90</b>	19.42	15.82	19.42	18.22
<b>120</b>	24.21	23.02	25.41	24.21
<b>150</b>	29.01	25.41	25.41	26.61
<b>180</b>	33.80	31.41	32.61	32.61
<b>210</b>	37.40	35.00	36.20	36.20
<b>240</b>	42.20	38.60	38.60	39.80
<b>270</b>	44.59	41.00	41.00	42.20
<b>300</b>	43.39	43.39	39.80	42.20
<b>330</b>	46.99	44.59	42.20	44.59
<b>360</b>	51.79	46.99	45.79	48.19

Formula III Replikasi 1

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.007	0.83114	0.00083	0.74802	1	6.23
<b>60</b>	0.016	2.26964	0.00227	2.04268	1	17.02
<b>90</b>	0.022	3.22864	0.00323	2.90578	1	24.21
<b>120</b>	0.027	4.02781	0.00403	3.62503	1	30.21
<b>150</b>	0.029	4.34748	0.00435	3.91273	1	32.61
<b>180</b>	0.032	4.82698	0.00483	4.34428	1	36.20
<b>210</b>	0.034	5.14665	0.00515	4.63198	1	38.60
<b>240</b>	0.034	5.14665	0.00515	4.63198	1	38.60
<b>270</b>	0.04	6.10565	0.00611	5.49509	1	45.79
<b>300</b>	0.042	6.42532	0.00643	5.78279	1	48.19
<b>330</b>	0.048	7.38432	0.00738	6.64589	1	55.38
<b>360</b>	0.055	8.50316	0.00850	7.65284	1	63.77

Formula III Replikasi 2

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.004	0.35163	0.00035	0.31647	1	2.64
<b>60</b>	0.014	1.94997	0.00195	1.75497	1	14.62
<b>90</b>	0.019	2.74914	0.00275	2.47423	1	20.62
<b>120</b>	0.023	3.38848	0.00339	3.04963	1	25.41
<b>150</b>	0.028	4.18764	0.00419	3.76888	1	31.41
<b>180</b>	0.032	4.82698	0.00483	4.34428	1	36.20
<b>210</b>	0.033	4.98681	0.00499	4.48813	1	37.40
<b>240</b>	0.035	5.30648	0.00531	4.77583	1	39.80
<b>270</b>	0.038	5.78598	0.00579	5.20738	1	43.39
<b>300</b>	0.037	5.62615	0.00563	5.06353	1	42.20
<b>330</b>	0.044	6.74499	0.00674	6.07049	1	50.59
<b>360</b>	0.05	7.70399	0.00770	6.93359	1	57.78

Formula III Replikasi 3

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.007	0.83114	0.00083	0.74802	1	6.23
<b>60</b>	0.018	2.58931	0.00259	2.33038	1	19.42
<b>90</b>	0.022	3.22864	0.00323	2.90578	1	24.21
<b>120</b>	0.028	4.18764	0.00419	3.76888	1	31.41
<b>150</b>	0.03	4.50731	0.00451	4.05658	1	33.80
<b>180</b>	0.035	5.30648	0.00531	4.77583	1	39.80
<b>210</b>	0.038	5.78598	0.00579	5.20738	1	43.39
<b>240</b>	0.039	5.94582	0.00595	5.35123	1	44.59
<b>270</b>	0.042	6.42532	0.00643	5.78279	1	48.19
<b>300</b>	0.044	6.74499	0.00674	6.07049	1	50.59
<b>330</b>	0.049	7.54415	0.00754	6.78974	1	56.58
<b>360</b>	0.054	8.34332	0.00834	7.50899	1	62.57

Rata-rata kadar salbutamol sulfat formula III

<b>Waktu (menit)</b>	<b>Replikasi 1</b>	<b>Replikasi 2</b>	<b>Replikasi 3</b>	<b>Rata-rata kadar %</b>
<b>30</b>	6.23	2.64	6.23	5.03
<b>60</b>	17.02	14.62	19.42	17.02
<b>90</b>	24.21	20.62	24.21	23.02
<b>120</b>	30.21	25.41	31.41	29.01
<b>150</b>	32.61	31.41	33.80	32.61
<b>180</b>	36.20	36.20	39.80	37.40
<b>210</b>	38.60	37.40	43.39	39.80
<b>240</b>	38.60	39.80	44.59	41.00
<b>270</b>	45.79	43.39	48.19	45.79
<b>300</b>	48.19	42.20	50.59	46.99
<b>330</b>	55.38	50.59	56.58	54.18
<b>360</b>	63.77	57.78	62.57	61.38

Formula Kontrol

Formula Kontrol Replikasi 1

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.032	4.8270	0.0048	4.3443	1	36.20
<b>60</b>	0.044	6.7450	0.0067	6.0705	1	50.59
<b>90</b>	0.059	9.1425	0.0091	8.2282	1	68.57
<b>120</b>	0.067	10.4212	0.0104	9.3790	1	78.16
<b>150</b>	0.075	11.6998	0.0117	10.5298	1	87.75
<b>180</b>	0.081	12.6588	0.0127	11.3930	1	94.94
<b>210</b>	0.083	12.9785	0.0130	11.6807	1	97.34
<b>240</b>	0.08	12.4990	0.0125	11.2491	1	93.74
<b>270</b>	0.084	13.1383	0.0131	11.8245	1	98.54
<b>300</b>	0.08	12.4990	0.0125	11.2491	1	93.74
<b>330</b>	0.076	11.8597	0.0119	10.6737	1	88.95
<b>360</b>	0.069	10.7408	0.0107	9.6667	1	80.56

Formula kontrol Replikasi 2

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.035	5.3065	0.0053	4.7758	1	39.80
<b>60</b>	0.048	7.3843	0.0074	6.6459	1	55.38
<b>90</b>	0.058	8.9827	0.0090	8.0844	1	67.37
<b>120</b>	0.069	10.7408	0.0107	9.6667	1	80.56
<b>150</b>	0.079	12.3392	0.0123	11.1053	1	92.54
<b>180</b>	0.082	12.8187	0.0128	11.5368	1	96.14
<b>210</b>	0.084	13.1383	0.0131	11.8245	1	98.54
<b>240</b>	0.08	12.4990	0.0125	11.2491	1	93.74
<b>270</b>	0.086	13.4580	0.0135	12.1122	1	100.94
<b>300</b>	0.079	12.3392	0.0123	11.1053	1	92.54
<b>330</b>	0.078	12.1793	0.0122	10.9614	1	91.35
<b>360</b>	0.071	11.0605	0.0111	9.9544	1	82.95

Formula Kontrol Replikasi 3

Waktu (menit)	Absorbansi	Kadar (ppm)	Kadar (mg/ml)	Kadar 900ml	Faktor pengenceran	Kadar %
30	0.035	5.3065	0.0053	4.7758	1	39.80
60	0.049	7.5442	0.0075	6.7897	1	56.58
90	0.06	9.3023	0.0093	8.3721	1	69.77
120	0.071	11.0605	0.0111	9.9544	1	82.95
150	0.077	12.0195	0.0120	10.8175	1	90.15
180	0.086	13.4580	0.0135	12.1122	1	100.94
210	0.085	13.2982	0.0133	11.9684	1	99.74
240	0.083	12.9785	0.0130	11.6807	1	97.34
270	0.085	13.2982	0.0133	11.9684	1	99.74
300	0.081	12.6588	0.0127	11.3930	1	94.94
330	0.071	11.0605	0.0111	9.9544	1	82.95
360	0.07	10.9007	0.0109	9.8106	1	81.75

Rata-rata kadar salbutamol sulfat formula kontrol

Waktu (menit)	Replikasi 1	Replikasi 2	Replikasi 3	Rata-rata kadar %
30	36.20	39.80	39.80	38.60
60	50.59	55.38	56.58	54.18
90	68.57	67.37	69.77	68.57
120	78.16	80.56	82.95	80.56
150	87.75	92.54	90.15	90.15
180	94.94	96.14	100.94	97.34
210	97.34	98.54	99.74	98.54
240	93.74	93.74	97.34	94.94
270	98.54	100.94	99.74	97.34
300	93.74	92.54	94.94	93.74
330	88.95	91.35	82.95	87.75
360	80.56	82.95	81.75	81.75

Persamaan Regresi linier waktu dan kadar

Formula	Persamaan regresi linier	R
Formula I	$Y = 1,93 + 0.114X$	0,997
Formula II	$Y = 5,96 + 0,127X$	0.969
Formula III	$Y = 8,09 + 0.144X$	0,978
Formula kontrol	$Y = 58,1 + 0.123X$	0.6967



## Lampiran 12. Analisis pola pelepasan salbutamol sulfat

### a. Analisis kinetika orde nol

Waktu (menit)	% pelepasan		
	Formula I	Formula II	Formula III
30	5.03	2.64	5.03
60	8.63	12.23	17.02
90	11.03	18.22	23.02
120	15.82	24.21	29.01
150	19.42	26.61	32.61
180	23.02	32.61	37.40
210	27.81	36.20	39.80
240	30.21	39.80	41.00
270	32.61	42.20	45.79
300	35.00	42.20	46.99
330	38.60	44.59	54.18
360	43.39	48.19	61.38

### Persamaan regresi linier % pelepasan dan waktu

Formula	Persamaan regresi linier	R
Formula I	$Y = 1,93 + 0.114X$	0,997
Formula II	$Y = 5,96 + 0,127X$	0,969
Formula III	$Y = 8,09 + 0.144X$	0,978

### 12.2. Analisis kinetika orde satu

Waktu (menit)	Log % pelepasan		
	Formula I	Formula II	Formula III
30	0.70	0.42	0.70
60	0.94	1.09	1.23
90	1.04	1.26	1.36
120	1.20	1.38	1.46
150	1.29	1.43	1.51
180	1.36	1.51	1.57
210	1.44	1.56	1.60
240	1.48	1.60	1.61
270	1.51	1.63	1.66
300	1.54	1.63	1.67
330	1.59	1.65	1.73
360	1.64	1.68	1.79

Persamaan regresi linier log % pelepasan dan waktu

<b>Formula</b>	<b>Persamaan regresi linier</b>	<b>R</b>
<b>Formula I</b>	$Y = 0,81 + 0,003X$	0,952
<b>Formula II</b>	$Y = 0,87 + 0,003X$	0,823
<b>Formula III</b>	$Y = 1,04 + 0,002X$	0,856

12.3. Analisis kinetika higuchi

<b>Akar Waktu (menit)</b>	<b>% pelepasan</b>		
	<b>Formula I</b>	<b>Formula II</b>	<b>Formula III</b>
<b>5,48</b>	5.03	2.64	5.03
<b>7,75</b>	8.63	12.23	17.02
<b>9,47</b>	11.03	18.22	23.02
<b>10,96</b>	15.82	24.21	29.01
<b>12,25</b>	19.42	26.61	32.61
<b>13,42</b>	23.02	32.61	37.40
<b>14,49</b>	27.81	36.20	39.80
<b>15,49</b>	30.21	39.80	41.00
<b>16,43</b>	32.61	42.20	45.79
<b>17,32</b>	35.00	42.20	46.99
<b>18,17</b>	38.60	44.59	54.18
<b>18,97</b>	43.39	48.19	61.38

Persamaan regresi linier % pelepasan dan akar waktu

<b>Formula</b>	<b>Persamaan regresi linier</b>	<b>R</b>
<b>Formula I</b>	$Y = -14,09 + 2,869X$	0,990
<b>Formula II</b>	$Y = -13,30 + 3,304X$	0,994
<b>Formula III</b>	$Y = -12,99 + 3,677X$	0,989

12.4. Analisis kinetika Power Law

<b>Log Waktu</b>	<b>Log % pelepasan</b>		
	<b>Formula I</b>	<b>Formula II</b>	<b>Formula III</b>
<b>1.48</b>	0.70	0.42	0.70
<b>1.78</b>	0.94	1.09	1.23
<b>1.95</b>	1.04	1.26	1.36
<b>2.08</b>	1.20	1.38	1.46
<b>2.18</b>	1.29	1.43	1.51
<b>2.26</b>	1.36	1.51	1.57
<b>2.32</b>	1.44	1.56	1.60
<b>2.38</b>	1.48	1.60	1.61
<b>2.43</b>	1.51	1.63	1.66
<b>2.48</b>	1.54	1.63	1.67
<b>2.52</b>	1.59	1.65	1.73
<b>2.56</b>	1.64	1.68	1.79

Persamaan regresi linier log % pelepasan dan log waktu

Formula	Persamaan regresi linier	R
Formula I	$Y = -0,63 + 0,881X$	0,998
Formula II	$Y = -0,88 + 1,039X$	0,957
Formula III	$Y = -0,415 + 0,867X$	0,968

### Lampiran 13. Uji sifat fisik granul dan tablet formula optimum

#### a. Kecepatan alir

Bobot (g)	Waktu (detik)	Kecepatan alir (gram/detik)
98,734	9.13	10.81424
	9.12	10.8261
	9.12	10.8261
Rata-rata		10.82214
Sd		

#### b. Sudut diam

Tinggi (cm)	Jari-jari (cm)	Sudut diam
3.07	5.275	30.1989
3.35	5.455	31.555
3.165	5.235	31.156
3.15	5.175	31.328
3.21	5.27	31.346
Rata-rata		31.1168
Sd		0.5323

#### c. Daya serap air

Berat granul + botol timbang	5 menit	10 menit	15 menit	Daya serap air
22.5467	22.5601	22.5818	22.5821	0.0345
22.5437	22.5668	22.5776	22.5781	0.0344
22.5454	22.5671	22.5809	22.5814	0.0360
Rata-rata				0.0353
SD				0.0008

#### d. Pengetapan

Volume awal (ml)	Volume akhir (ml)	% pengetapan
100	95	5
100	96	4
100	93	7
Rata-rata		5.33
Sd		

**e. Kompaktibilitas**

Tablet	Kompaktibilitas (kg)
1	14
2	13.8
3	13.8
Rata-rata	13.8667
Sd	0.11547

**f. Keseragaman bobot**

Tablet	Bobot (mg)
1	0.2046
2	0.2022
3	0.2045
4	0.2029
5	0.1995
6	0.2044
7	0.2011
8	0.2017
9	0.2029
10	0.2026
11	0.2031
12	0.2017
13	0.2013
14	0.2021
15	0.2014
16	0.2008
17	0.2041
18	0.2024
19	0.2006
20	0.2019
Rata-rata	0.2023
Sd	

**g. Kerapuhan**

Bobot awal = 4,168gram

Bobot akhir = 4,155 gram

$$\% \text{ Kerapuhan} = \frac{4,168 - 4,155}{4,168} \times 100\% = 0,3 \%$$

## **h. Disolusi**

### **h.1. Replikasi I.**

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.01	1.3106	0.0013	1.1796	1	9.83
<b>60</b>	0.013	1.7901	0.0018	1.6111	1	13.43
<b>90</b>	0.015	2.1098	0.0021	1.8988	1	15.82
<b>120</b>	0.017	2.4295	0.0024	2.1865	1	18.22
<b>150</b>	0.021	3.0688	0.0031	2.7619	1	23.02
<b>180</b>	0.026	3.8680	0.0039	3.4812	1	29.01
<b>210</b>	0.031	4.6671	0.0047	4.2004	1	35.00
<b>240</b>	0.034	5.1466	0.0051	4.6320	1	38.60
<b>270</b>	0.036	5.4663	0.0055	4.9197	1	41.00
<b>300</b>	0.04	6.1057	0.0061	5.4951	1	45.79
<b>330</b>	0.043	6.5852	0.0066	5.9266	1	49.39
<b>360</b>	0.045	6.9048	0.0069	6.2143	1	51.79

### **h.2. Replikasi 2**

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.013	1.7901	0.0018	1.6111	1	13.43
<b>60</b>	0.015	2.1098	0.0021	1.8988	1	15.82
<b>90</b>	0.019	2.7491	0.0027	2.4742	1	20.62
<b>120</b>	0.021	3.0688	0.0031	2.7619	1	23.02
<b>150</b>	0.023	3.3885	0.0034	3.0496	1	25.41
<b>180</b>	0.03	4.5073	0.0045	4.0566	1	33.80
<b>210</b>	0.036	5.4663	0.0055	4.9197	1	41.00
<b>240</b>	0.035	5.3065	0.0053	4.7758	1	39.80
<b>270</b>	0.039	5.9458	0.0059	5.3512	1	44.59
<b>300</b>	0.04	6.1057	0.0061	5.4951	1	45.79
<b>330</b>	0.042	6.4253	0.0064	5.7828	1	48.19
<b>360</b>	0.044	6.7450	0.0067	6.0705	1	50.59

### **h.3. Replikasi 3**

<b>Waktu (menit)</b>	<b>Absorbansi</b>	<b>Kadar (ppm)</b>	<b>Kadar (mg/ml)</b>	<b>Kadar 900ml</b>	<b>Faktor pengenceran</b>	<b>Kadar %</b>
<b>30</b>	0.011	1.4705	0.0015	1.3234	1	11.03
<b>60</b>	0.015	2.1098	0.0021	1.8988	1	15.82
<b>90</b>	0.019	2.7491	0.0027	2.4742	1	20.62
<b>120</b>	0.022	3.2286	0.0032	2.9058	1	24.21
<b>150</b>	0.025	3.7081	0.0037	3.3373	1	27.81
<b>180</b>	0.028	4.1876	0.0042	3.7689	1	31.41
<b>210</b>	0.032	4.8270	0.0048	4.3443	1	36.20
<b>240</b>	0.036	5.4663	0.0055	4.9197	1	41.00
<b>270</b>	0.039	5.9458	0.0059	5.3512	1	44.59
<b>300</b>	0.042	6.4253	0.0064	5.7828	1	48.19
<b>330</b>	0.044	6.7450	0.0067	6.0705	1	50.59
<b>360</b>	0.044	6.7450	0.0067	6.0705	1	50.59

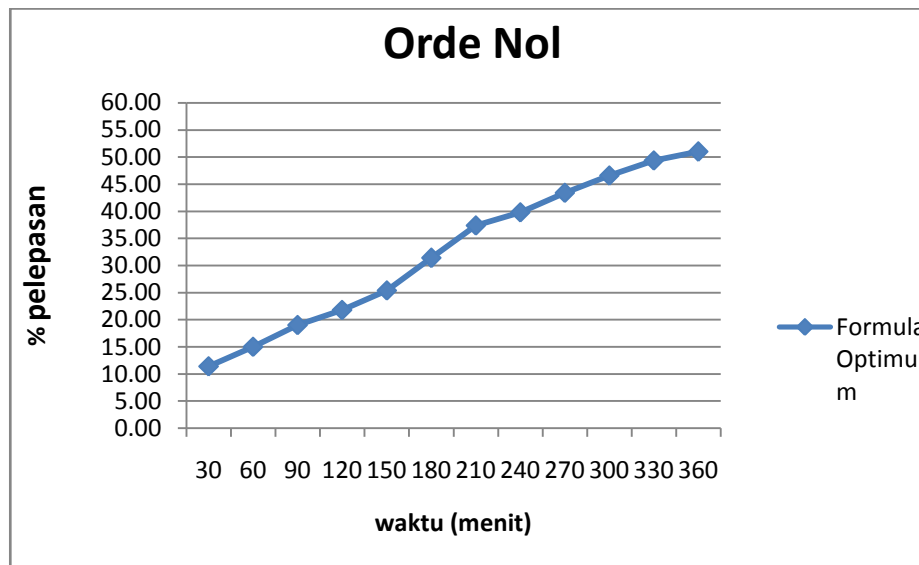
### **h.4. Rata – rata**

<b>Waktu (menit)</b>	<b>Replikasi I</b>	<b>Replikasi II</b>	<b>Replikasi III</b>	<b>Rata-rata</b>
<b>30</b>	9.83	13.43	11.03	11.43
<b>60</b>	13.43	15.82	15.82	15.02
<b>90</b>	15.82	20.62	20.62	19.02
<b>120</b>	18.22	23.02	24.21	21.82
<b>150</b>	23.02	25.41	27.81	25.41
<b>180</b>	29.01	33.80	31.41	31.41
<b>210</b>	35.00	41.00	36.20	37.40
<b>240</b>	38.60	39.80	41.00	39.80
<b>270</b>	41.00	44.59	44.59	43.39
<b>300</b>	45.79	45.79	48.19	46.59
<b>330</b>	49.39	48.19	50.59	49.39
<b>360</b>	51.79	50.59	50.59	50.99

## **Lampiran 14. Analisis kinetika pelepasan formula optimum**

### **14.a. Kinetika pelepasan orde nol**

<b>Waktu (menit)</b>	<b>kadar % pelepasan</b>
<b>30</b>	11.43
<b>60</b>	15.02
<b>90</b>	19.02
<b>120</b>	21.82
<b>150</b>	25.41
<b>180</b>	31.41
<b>210</b>	37.40
<b>240</b>	39.80
<b>270</b>	43.39
<b>300</b>	46.59
<b>330</b>	49.39
<b>360</b>	50.99



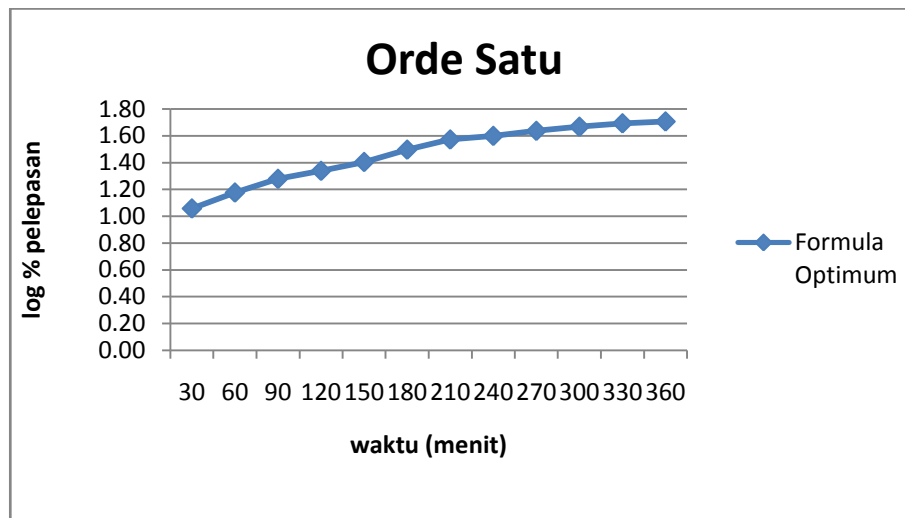
Persamaan regresi linier waktu vs % pelepasan

$$Y = 7.7644 + 0.1276x$$

$$R = 0.9944$$

#### 14.b. Kinetika pelepasan orde Satu

Waktu (menit)	Log % pelepasan
30	1.0580
60	1.1768
90	1.2792
120	1.3388
150	1.4051
180	1.4970
210	1.5729
240	1.5999
270	1.6374
300	1.6683
330	1.6936
360	1.7075



Persamaan regresi linier waktu vs log % pelepasan

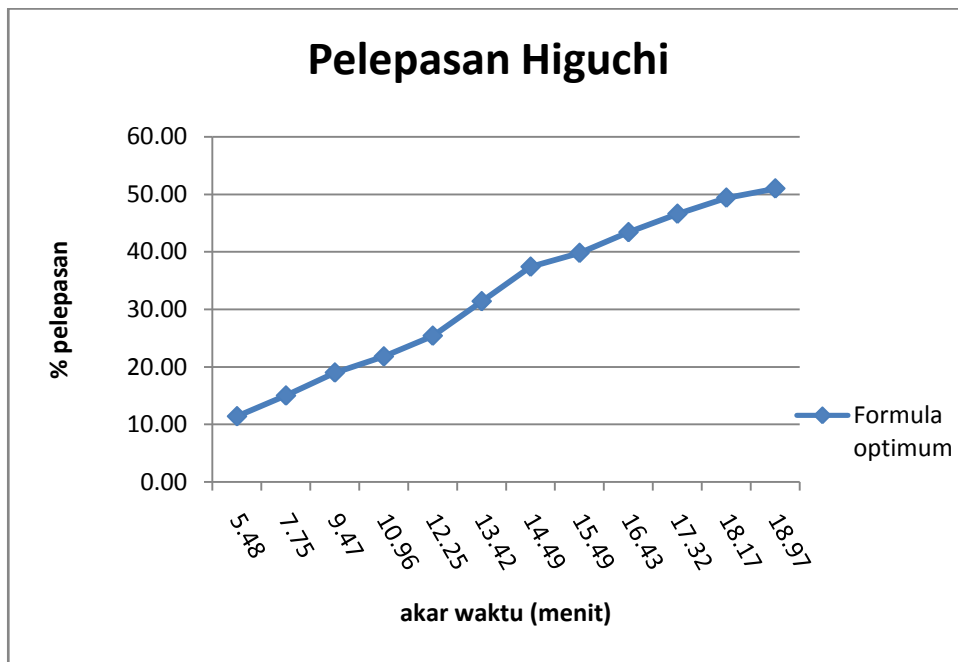
$$Y = 1.0906 + 0.00194X$$

$$R = 0.97097$$

#### 14.c. Kinetika pelepasan model higuchi

Waktu (menit)	kadar % pelepasan
5.48	11.43
7.75	15.02
9.47	19.02
10.96	21.82
12.25	25.41
13.42	31.41
14.49	37.40
15.49	39.80
16.43	43.39
17.32	46.59
18.17	49.39
18.97	50.99





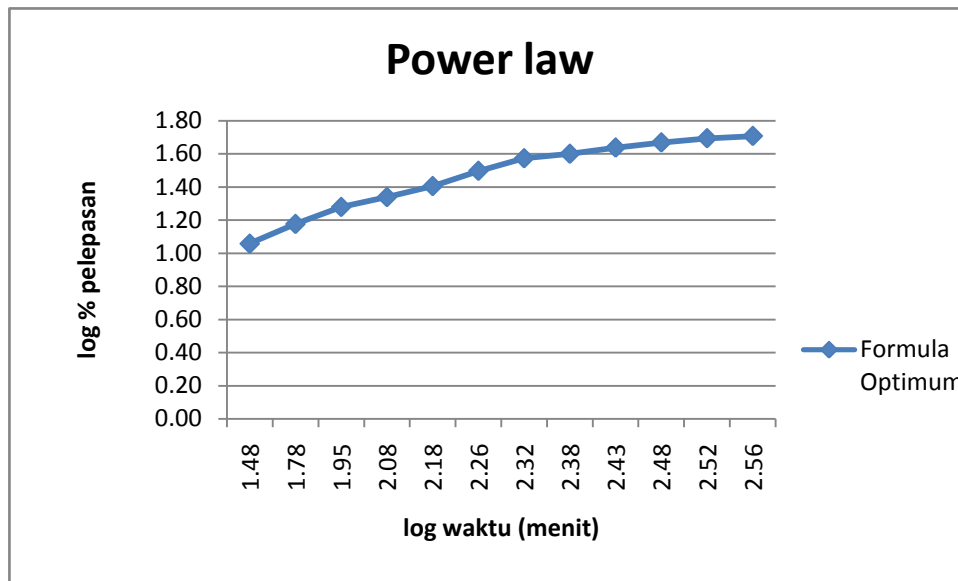
Persamaan regresi linier akar waktu vs % pelepasan

$$Y = -10.1700 + 3.2066X$$

R = 0.9884

#### 14.d. Kinetika pelepasan model peppas

Waktu (menit)	Log % pelepasan
1.48	1.0580
1.78	1.1768
1.95	1.2792
2.08	1.3388
2.18	1.4051
2.26	1.4970
2.32	1.5729
2.38	1.5999
2.43	1.6374
2.48	1.6683
2.52	1.6936
2.56	1.7075



Persamaan regresi linier log waktu vs log % pelepasan

$$Y = 0.03476 + 0.652025X$$

$$R = 0.98867$$

### Lampiran 15. Analisis Statistik

#### 15.1. Waktu alir

##### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
waktu alir	6	9.1200	9.1300	9.123417E0	.0036526
Valid N (listwise)	6				

##### NPar Tests

##### One-Sample Kolmogorov-Smirnov Test

		waktu alir
N		6
Normal Parameters <sup>a</sup>	Mean	9.123417
	Std. Deviation	.0036526
Most Extreme Differences	Absolute	.324
	Positive	.324
	Negative	-.176
Kolmogorov-Smirnov Z		.794
Asymp. Sig. (2-tailed)		.554

a. Test distribution is Normal.

### One-Sample Kolmogorov-Smirnov Test

		waktu alir
N		6
Normal Parameters <sup>a</sup>	Mean	9.123417
	Std. Deviation	.0036526
Most Extreme Differences	Absolute	.324
	Positive	.324
	Negative	-.176
Kolmogorov-Smirnov Z		.794
Asymp. Sig. (2-tailed)		.554

### T-Test

#### Group Statistics

Formula	N	Mean	Std. Deviation	Std. Error Mean
waktu alir Prediksi	3	9.123500E0	.0000000	.0000000
Percobaan	3	9.123333E0	.0057735	.0033333

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
waktu alir Equal variances assumed	16.000	.016	.050	4	.963	.0001667	.0033333	-.0090882	.0094215
waktu alir Equal variances not assumed			.050	2.000	.965	.0001667	.0033333	-.0141755	.0145088

## 15.2. DAYA SERAP AIR

### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Daya Serap Air	6	.0344	.0360	.035458	.0005526

### NPar Tests

#### One-Sample Kolmogorov-Smirnov Test

		Daya Serap Air
N		6
Normal Parameters <sup>a</sup>	Mean	.035458
	Std. Deviation	.0005526
Most Extreme Differences	Absolute	.302
	Positive	.198
	Negative	-.302
Kolmogorov-Smirnov Z		.740
Asymp. Sig. (2-tailed)		.643

a. Test distribution is Normal.

### T-Test

#### Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
Daya Serap Air	Prediksi	3	.035650	.0000000	.0000000
	Percobaan	3	.035267	.0008083	.0004667

### Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Daya Equal variance assumed	6.563	.063	.821	4	.458	.0003833	.0004667	-.0009123	.0016790
Equal variance not assumed			.821	2.000	.498	.0003833	.0004667	-.0016246	.0023912

### 15.3. Kompaktibilitas

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Kompaktibilitas	6	13.0000	14.0000	1.372950	.3634891

### NPar Tests

#### One-Sample Kolmogorov-Smirnov Test

		Kompaktibilitas
N		6
Normal Parameters <sup>a</sup>	Mean	13.729500
	Std. Deviation	.3634891
Most Extreme Differences	Absolute	.410
	Positive	.228
	Negative	-.410
Kolmogorov-Smirnov Z		1.005
Asymp. Sig. (2-tailed)		.265

a. Test distribution is Normal.

## T-Test

### Group Statistics

	Formula	N	Mean	Std. Deviation	Std. Error Mean
kompaktibilitas	prediksi	3	1.3859001	.0000000	.0000000
	Percobaan	3	1.3600001	.5291503	.3055050

### Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Kompaktibilitas	Equal variances assumed	12.000	.026	.848	4	.444	.2590000	.3055050	-.5892180	1.1072180
	Equal variances not assumed			.848	2.000	.486	.2590000	.3055050	1.0554821	1.5734821

## 15.4. Disolusi (Slope)

### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Slope	6	.1199	.1354	.123718	.0063133
Valid N (listwise)	6				

**NPar Tests**

**One-Sample Kolmogorov-Smirnov Test**

		slope
N		6
Normal Parameters <sup>a</sup>	Mean	.123718
	Std. Deviation	.0063133
Most Extreme Differences	Absolute	.358
	Positive	.358
	Negative	-.271
Kolmogorov-Smirnov Z		.876
Asymp. Sig. (2-tailed)		.427

a. Test distribution is Normal.

**T-Test**

**Group Statistics**

Formula		N	Mean	Std. Deviation	Std. Error Mean
Slope	Prediksi	3	.119875	.0000000	.0000000
	Percobaan	3	.127560	.0074398	.0042954

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Slope	Equal variances assumed	5.591	.077	1.789	4	.148	-.0076850	.0042954	-.0196109	.0042409
	Equal variances not assumed			1.789	2.000	.215	-.0076850	.0042954	-.0261665	.0107965